

REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Convert to approved source format.	82-06-04	N. A. Hauck
B	Addition of MIL spec replacement numbers plus part number corrections, editorial changes.	82-08-11	N. A. Hauck
C	Added 1 vendor, FSCM 27014	83-09-05	N. A. Hauck
D	Removed 1 vendor; FSCM 27014 for device 02. Inactivate device 01, case C only for new design. Removed 1 vendor; FSCM 31019 for device 01, case D.	85-01-04	N. A. Hauck
E	Technical and editorial changes throughout. Changed to SMD format. Added device type 03.	94-02-17	M. L. Poelking

THE FRONT PAGE OF THIS DRAWING HAS BEEN REPLACED

**CURRENT CAGE CODE 67268**

REV																			
SHEET																			
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REV STATUS OF SHEETS				REV		E	E	E	E	E	E	E	E						
				SHEET		1	2	3	4	5	6	7	8	9					
PMIC N/A				PREPARED BY A. J. Foley					DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444										
STANDARDIZED MILITARY DRAWING  THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE  AMSC N/A																			
				CHECKED BY C. R. Jackson															
				APPROVED BY N. A. Hauck					MICROCIRCUIT, DIGITAL, CMOS DUAL D FLIP-FLOP MONOLITHIC SILICON										
				DRAWING APPROVAL DATE 79-05-14															
AMSC N/A				REVISION LEVEL  E					SIZE A	CAGE CODE 14933	79011								
				SHEET 1 OF 9															

## 1. SCOPE

1.1 Scope. This drawing describes device requirements for class B microcircuits in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices".

1.2 Part or Identifying Number (PIN). The complete PIN shall be as shown in the following example:

<u>79011</u>	<u>01</u>	<u>C</u>	<u>X</u>
-----	-----	-----	-----
Drawing number	Device type (see 1.2.1)	Case outline (see 1.2.2)	Lead finish per MIL-M-38510

1.2.1 Device type(s). The device type(s) shall identify the circuit function as follows:

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	4013B	Dual D type flip-flop
02	4013B	Dual D type flip-flop
03	14013B	Dual D type flip-flop

1.2.2 Case outline(s). The case outline shall be as designated in MIL-STD-1835 and as follows:

<u>Outline letter</u>	<u>Descriptive designator</u>	<u>Terminals</u>	<u>Package style</u>
C	CDIP2-T14 or GDIP1-T14	14	Dual-in-line package
D	CDFP2-F14 or GDFP1-F14	14	flat-package

1.2.3 Lead finish. The lead finish shall be as specified in MIL-STD-883 (see 3.1 herein). Finish letter "X" shall not be marked on the microcircuit or its packaging. The "X" designation is for use in specifications when lead finishes A, B, and Care considered acceptable and interchangeable without preference

## 1.3 Absolute maximum ratings.

Supply voltage range ( $V_{DD}$ )	-----	-0.5 V dc to +18 V dc
Input voltage range	-----	-0.5 V dc to $V_{DD} + 0.5$ V dc
Storage temperature range	-----	-65° C to +150° C
Maximum power dissipation per device ( $P_D$ ) <u>1/</u>	-----	500 mW <u>2/</u>
Lead temperature (soldering 10 seconds)	-----	+300° C
Thermal resistance, junction to case ( $O_{JC}$ )	-----	See MIL-STD-1835
Junction temperature ( $T_J$ )	-----	+175° C

## 1.4 Recommended operating conditions.

Supply voltage	-----	+3.0 V dc to +15 V dc
Case operating temperature range	-----	-55° C to +125° C

1/ Must withstand the added  $P_D$  due to short circuit test, e.g.,  $I_{OS}$ .

2/ For  $T_C = +100^\circ\text{C}$  to  $+125^\circ\text{C}$ , derate linearly at 12 mW/° C to 200 mW.

<b>STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444</b>	SIZE <b>A</b>		<b>79011</b>
		REVISION LEVEL E	SHEET <b>2</b>

## 2. APPLICABLE DOCUMENTS

2.1 Government specifications, standards and bulletin. Unless otherwise specified, the following specifications standards, and bulletin of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this specification to the extent specified herein.

### SPECIFICATION

#### MILITARY

MIL-I-38535 - Integrated Circuits (Microcircuits) Manufacturing, General Specification for

### STANDARD

#### MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.  
MIL-STD-1835 - Microcircuit Case Outlines.

### BULLETIN

#### MILITARY

MIL-BUL-103 - List of Standardized Military Drawing (SMD's).

(Copies of specifications, standards, and bulletin required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

## 3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices" and as specified herein. Product built to this drawing that is produced by a Qualified Manufacturer Listing (QML) certified and qualified manufacturer or a manufacturer who has been granted transitional certification to MIL-I-38535 may be processed as QML product in accordance with the manufacturers approved program plan and qualifying activity approval in accordance with MIL-I-38535. This QML flow as documented in the Quality Management (QM) plan may make modifications to the requirements herein. These modifications shall not affect form, fit, or function of the device. These modifications shall not affect the PIN as described herein. A "Q" or "QML" certification mark in accordance with MIL-I-38535 is required to identify when the QML flow option is used.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-STD-883(see 3.1 herein) and herein.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.2 herein.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 1.

3.2.3 Truth table(s). The truth table(s) shall be as specified on figure 2.

3.3 Lead material and finish. The lead material and finish shall be in accordance with MIL-M-38510.

3.4 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in table I and apply over the full case operating temperature range.

3.5 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table I.

3.6 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked as listed in MIL-BUL-103 (see 6.6 herein).

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE <b>A</b>		<b>79011</b>
		REVISION LEVEL E	SHEET <b>3</b>

TABLE I. Electrical characteristics.

Test	Symbol	Conditions -55°C ≤ T <sub>C</sub> ≤ 125°C Unless otherwise specified	Device type	Group A subgroups	Limits		Units
					Min	Max	
High-level output voltage	V <sub>OH</sub>	V <sub>DD</sub> = 5 V, V <sub>IN</sub> = 0 V or V <sub>DD</sub> V <sub>DD</sub> = 10 V V <sub>DD</sub> = 15 V	All	1, 2, 3	4.95 9.95 14.95		V
Low-level output voltage	V <sub>OL</sub>	V <sub>DD</sub> = 5 V, V <sub>IN</sub> = 0 V or V <sub>DD</sub> V <sub>DD</sub> = 10 V V <sub>DD</sub> = 15 V	All	1, 2, 3		0.05 0.05 0.05	V
High-level input voltage	V <sub>IH</sub>	V <sub>DD</sub> = 5 V, V <sub>O</sub> = 0.5 or 4.5 V V <sub>DD</sub> = 10 V, V <sub>O</sub> = 1.0 or 9.0 V V <sub>DD</sub> = 15 V, V <sub>O</sub> = 1.5 or 13.5 V	All	1, 2, 3	3.5 7.0 11.0		V
Low-level input voltage	V <sub>IL</sub>	V <sub>DD</sub> = 5 V, V <sub>O</sub> = 0.5 or 4.5 V V <sub>DD</sub> = 10 V, V <sub>O</sub> = 1.0 or 9.0 V V <sub>DD</sub> = 15 V, V <sub>O</sub> = 1.5 or 13.5 V	All	1, 2, 3		1.5 3.0 4.0	V
Input capacitance	C <sub>IN</sub>	V <sub>IN</sub> = 0 V see 4.4.1c	All	4		7.5	pF
Quiescent current	I <sub>DD</sub>	V <sub>DD</sub> = 5.0 V V <sub>IN</sub> = 0 V or V <sub>DD</sub>	All	1, 3 2		1.0 30.0	μA
		V <sub>DD</sub> = 10 V V <sub>IN</sub> = 0 V or V <sub>DD</sub>	All	1, 3 2		2.0 60.0	
		V <sub>DD</sub> = 15 V V <sub>IN</sub> = 0 V or V <sub>DD</sub>	All	1, 3 2		4.0 120	
Input leakage current	I <sub>IN</sub>	V <sub>IN</sub> = 0 V or 15.0 V	All	1, 2, 3		±1.0	μA
Functional tests		See 4.4.1d	All	7,8			
Propagation delay, clock to Q or $\bar{Q}$ outputs	t <sub>PHL1</sub> , t <sub>PLH1</sub>	V <sub>DD</sub> = 5.0 V C <sub>L</sub> = 50 pF R <sub>L</sub> = 200 kΩ	01	9	1.0	350	ns
			02		15	400	
			03			350	
		V <sub>DD</sub> = 5.0 V C <sub>L</sub> = 50 pF R <sub>L</sub> = 200 kΩ	01	10, 11	1.0	437	
			02		23	560	
			03			525	

STANDARDIZED  
MILITARY DRAWING  
DEFENSE ELECTRONICS SUPPLY CENTER  
DAYTON, OHIO 45444

SIZE  
**A**

**79011**

REVISION LEVEL  
E

SHEET  
**4**

TABLE I. Electrical characteristics - Continued.

Test	Symbol	Conditions -55°C ≤ T <sub>C</sub> ≤ 125°C Unless otherwise specified	Device type	Group A subgroups	Limits		Units
					Min	Max	
Propagation delay time low-to-high level Set to $\bar{Q}$ or Reset to $\bar{Q}$	t <sub>PLH2</sub>	V <sub>DD</sub> = 5.0 V C <sub>L</sub> = 50 pF R <sub>L</sub> = 200 kΩ	01,02	9	1.0	300	ns
			03			450	
		V <sub>DD</sub> = 5.0 V C <sub>L</sub> = 50 pF R <sub>L</sub> = 200 kΩ	01	10, 11	1.0	375	
			02		23	450	
			03			675	
Propagation delay time high-to-low level Set to $\bar{Q}$ or Reset to Q	t <sub>PHL2</sub>	V <sub>DD</sub> = 5.0 V C <sub>L</sub> = 50 pF R <sub>L</sub> = 200 kΩ	01	9	1.0	300	
			02		20	400	
			03			450	
		V <sub>DD</sub> = 5.0 V C <sub>L</sub> = 50 pF R <sub>L</sub> = 200 kΩ	01	10, 11	1.0	375	
			02		30	600	
			03			675	
Transition time	t <sub>THL</sub> , t <sub>TLH</sub>	V <sub>DD</sub> = 5.0 V C <sub>L</sub> = 50 pF R <sub>L</sub> = 200 kΩ	01	9	1.0	200	ns
			02		10	200	
			03			200	
		V <sub>DD</sub> = 5.0 V C <sub>L</sub> = 50 pF R <sub>L</sub> = 200 kΩ	01	10, 11	1.0	300	
			02		15	300	
			03			300	

STANDARDIZED  
MILITARY DRAWING  
DEFENSE ELECTRONICS SUPPLY CENTER  
DAYTON, OHIO 45444

SIZE  
**A**

**79011**

REVISION LEVEL  
E

SHEET  
**5**

TABLE I. Electrical characteristics - Continued.

Test	Symbol	Conditions -55° C ≤ T <sub>C</sub> ≤ 125° C Unless otherwise specified	Device type	Group A subgroups	Limits		Units
					Min	Max	
Maximum clock frequency	f <sub>MAX</sub>	V <sub>DD</sub> = 5.0 C <sub>L</sub> = 50 pF R <sub>L</sub> = 200 kΩ	01	9	3.5		MHz
			02		2.5		
			03		2.0		
		V <sub>DD</sub> = 5.0 V C <sub>L</sub> = 50 pF R <sub>L</sub> = 200 kΩ	01	10, 11	2.5		
			02		2.2		
			03		1.3		
Minimum clock pulse width	t <sub>CP</sub>	V <sub>DD</sub> = 5.0 V	01,02	9		200	ns
			03			250	

3.7 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in MIL-BUL-103 (see 6.6 herein). The certificate of compliance submitted to DESC-EC prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

3.8 Certificate of conformance. A certificate of conformance as required in MIL-STD-883 (see 3.1 herein) shall be provided with each lot of microcircuits delivered to this drawing.

3.9 Notification of change. Notification of change to DESC-EC shall be required in accordance with MIL-STD-883 (see 3.1 herein).

3.10 Verification and review. DESC, DESC's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-STD-883 (see 3.1 herein).

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. The following additional criteria shall apply:

- a. Burn-in test, method 1015 of MIL-STD-883.
  - (1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1015 of MIL-STD-883.
  - (2) T<sub>A</sub> = 125° C, minimum.
- b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.
- c. The percent defective allowable (PDA) shall be as specified in MIL-I-38535, appendix A.

**STANDARDIZED  
MILITARY DRAWING  
DEFENSE ELECTRONICS SUPPLY CENTER  
DAYTON, OHIO 45444**

**SIZE  
A**




**79011**

REVISION LEVEL  
E

SHEET  
**6**

Device types	01, 02, and 03
Case outlines	C and D
Terminal number	Terminal symbol
1	Q1
2	$\bar{Q}1$
3	CLK1
4	RESET1
5	D1
6	SET1
7	V <sub>SS</sub>
8	SET2
9	D2
10	RESET2
11	CLK2
12	Q2
13	Q2
14	V <sub>DD</sub>

FIGURE 1. Terminal connections.

Inputs				Outputs	
Clock	Data	Reset	Set	Q	$\bar{Q}$
	L	L	L	L	H
	H	L	L	H	L
	X	L	L	Q	$\bar{Q}$
X	X	H	L	L	H
X	X	L	H	H	L
X	X	H	H	H	H

X = Don't care  
 L = Low logic level  
 H = High logic level  
 $\bar{Q}$ , Q = No change

FIGURE 2. Truth table.

<b>STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444</b>	SIZE <b>A</b>		<b>79011</b>
		REVISION LEVEL E	SHEET <b>7</b>

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with Method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

4.3.1 Group A inspection.

- a. Tests shall be as specified in table II herein.
- b. Subgroups 5, and 6 of table I of method 5005 of MIL-STD-883 shall be omitted.
- c. Subgroup 4 ( $C_{IN}$  measurement) shall be measured only for the initial test and after process or design changes which may affect input capacitance. Test all applicable pins on five devices with zero failures.
- d. Subgroup 7 and 8 shall include verification of the truth table as specified on figure 2 herein.

4.3.2 Groups C and D inspections.

- a. End-point electrical parameters shall be as specified in table II herein.
- b. Steady state life test conditions, method 1005 of MIL-STD-883. The test circuit shall be maintained by the manufacturer under document revision level control.
  - (1) Test condition A, B, C, or D.
  - (2)  $T_A = 125^\circ\text{C}$ , minimum.
  - (3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups Method 5005, table I
Interim electrical parameters (pre burn-in) (method 5004, 3.1.8)	---
Final electrical test parameters (method 5004, 3.1.14)	1*, 2, 3, 9
Group A test requirements (method 5005)	1, 2, 3, 4, 7, 8, 9, 10**, 11**
Groups C and D end-point electrical parameters (method 5005)	1, 2, 3

\* PDA applies to subgroup 1 (see 4.3c).

\*\* Subgroups 10 and 11, if not tested, shall be guaranteed to the specified limits in table I.

<b>STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444</b>	<b>SIZE A</b>		<b>79011</b>
		<b>REVISION LEVEL E</b>	<b>SHEET 8</b>



## 5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-STD-883 (see 3.1 herein).

## 6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use for Government microcircuit applications (original equipment), design applications, and logistics purposes.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished in accordance with MIL-STD-973 using DD Form 1692, Engineering Change Proposal .

6.4 Record of users. Military and industrial users shall inform Defense Electronics Supply Center when a system application requires configuration control and the applicable SMD. DESC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronics devices (FSC 5962) should contact DESC-EC, telephone (513) 296-6047.

6.5 Comments. Comments on this drawing should be directed to DESC-EC, Dayton, OH 45444-5270 , or telephone 513-296-8525.

6.6 Approved sources of supply. Approved sources of supply are listed in MIL-BUL-103. The vendor listed in MIL-BUL 103 have agreed to this drawing and a certificate of compliance (see 3.6) has been submitted to and accepted DESC-EC.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE <b>A</b>		<b>79011</b>
		REVISION LEVEL E	SHEET <b>9</b>

STANDARDIZED MILITARY DRAWING SOURCE APPROVAL BULLETIN  
DATE: 94-02-17

Approved sources of supply for SMD 79011 are listed below for immediate acquisition only and shall be added to MIL-BUL-103 during the next revision. MIL-BUL-103 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DESC-EC. This bulletin is superseded by the next dated revision of MIL-BUL-103.

DESC drawing part number	Vendor CAGE number	Vendor similar part number <u>1/</u>
7901101CX 7901101DX	27014 27014	CD4013BMJ/883 CD4013BMW/883
7901102CX 7901102DX	<u>2/</u>	CD4013BMJ/883B CD4013BMW/883B
7901103CX	04713	14013B/BCAJC

1/ Caution. Do not use this number for item acquisition.  
Items acquired to this number may not satisfy the  
performance requirements of this drawing.

2/ Not available from an approved source.

Vendor CAGE  
number

27014

Vendor name  
and address

National Semiconductor  
2900 Semiconductor Drive  
Santa Clara, CA 95052-8090  
Point of contact: 333 Western Avenue  
South Portland, ME 04106

04713

Motorola Incorporated  
5005 E. McDowell RD  
Phoenix, AZ 85008-4229  
Point of contact: 2100 E. Elliot RD  
Tempe, AZ 85284-1801

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